Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per: \_\_\_\_\_

**GUIDED NOTES**: GRAVITY Ch. 12 Section \_\_\_\_ pp \_\_\_\_ - \_\_\_\_\_

*A. GRAVITY* - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**All matter has gravity**…but it’s only noticeable between massive objects (like planets…)

The size of this force depends on 2 factors:

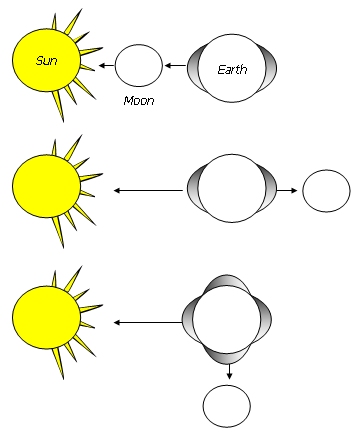
1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ex:

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*\*As distance between two objects \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the force of gravity*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



\*Explain ocean tides in terms of gravitational attraction:

\*On Earth, why is your weight slightly different at the equator than at the poles?

You weigh slightly \_\_\_\_\_\_\_\_\_\_\_ at the poles because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**The Law of Universal Gravitation –**

**Formula**:

-As the **distance** between the objects \_\_\_\_\_\_\_\_\_\_, **force** \_\_\_\_\_\_\_\_\_\_\_\_\_.

-As the \_\_\_\_\_\_\_\_\_ increases, **force** \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**NECAP question**: Which of Jupiter’s moons experience the **greatest** gravitational force of attraction to Jupiter?

The correct answer was \_\_\_\_\_ because:

*B. Weight vs. Mass*

1. **Mass** = The amount of \_\_\_\_\_\_\_\_\_\_\_\_ in an object that \_\_\_\_\_\_\_\_\_\_\_\_ changes.

The SI units of measurement are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **Weight** =
   * The gravitational \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that an object experiences because of its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Weight changes- depending on the location.

**Formula**: \_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_\_\_\_\_\_\_

*C. Acceleration of free-falling objects*

1. All objects accelerate (change \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) towards the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the Earth due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* The rate of acceleration due to gravity (on Earth) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* This means that the velocity of a freely falling object \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_\_\_\_ m/s for every \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that passes (up to a certain point…when it reaches terminal velocity)

***Why don’t all objects hit the ground at the same time on Earth?***

* + But…on Earth, NOT ALL OBJECTS HIT THE GROUND AT THE SAME TIME BECAUSE of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* On the moon…all objects hit the surface at the SAME time because there is no \_\_\_\_\_\_\_\_\_ on the moon. There is \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Gravity = \_\_\_\_\_ of Earth.
* Describe the lunar experiment performed by the crew of Apollo 15 (1971).

The lunar experiment performed on the Moon demonstrated that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*D. Terminal Velocity*

* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ speed that an object can have in freefall due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

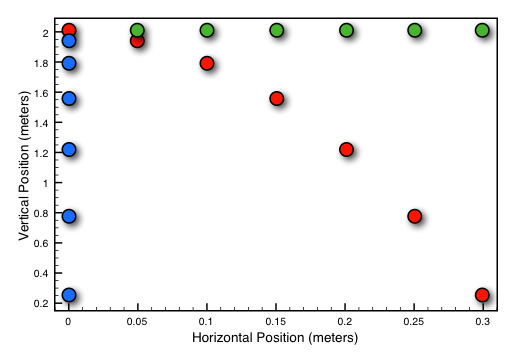
**ARE EQUAL**

* Terminal velocity changes depending on the object’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ,

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ OR \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* As objects fall, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_increases until it balances the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the object. (SEE SQUIRREL SUIT VIDEO CLIP)
* Therefore, a heavier object will accelerate for a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ time period and have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ terminal velocity.
* Falling Penny MythBusters Video Clip (see PowerPoint on website to review/watch)

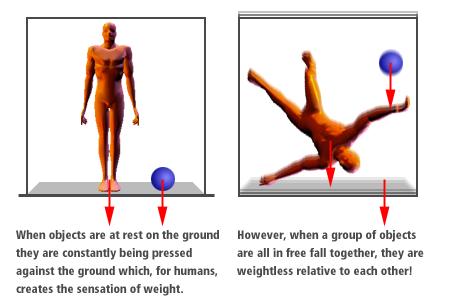
*E. Projectile Motion*

* Motion that has two components (horizontal & vertical) that combine to form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ path
* The two motions DO NOT affect each other

**LABEL** the DIAGRAM of projectile motion

(falling in a curved path)

🡪 Combination of both motions!!!



In ISS, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ towards Earth and gravity is about the same as on Earth (~90%) **BUT** the spacecraft is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so the ISS does not get any closer to Earth’s surface. (basically…it’s falling at the same rate as it’s moving sideways)

Astronauts “float” when inside an orbiting spaceship because they are

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!